Attachment D

INTEGRATION PANEL STRESSOR RANKINGS

PRIMARY SPECIES: S.J. FALL RUN (tier one)

STRESSORS	RANK	COMMENTS
Alteration of Flows	H	Entrainment at diversion sites, barriers to historic habitat. Causes delayed migration, associated high mortality due to predation, decrease in biodiversity of habitat & stranding of fish.
Floodplain and Marshplain Changes	H	System severely ltered. Restoration on mainstem needs to be tied to changes in the hydrograph to avoid stranding due to flow reductions after inundation of floodplain. There is more opportunity for restoration on tributaries. Levees on lower San Joaquin River.
Channel Form Changes	H	Gravel mining, gold dredging on tributaries, flood control projects on the mainstem San Joaquin River. Degradation of instream habitat, elevated predation in gravel ponds, gravel recruitment limitations.
Water Quality	M/H	Concerns with dissolved oxygen and water temperature during upstream migration and outmigration. Ag runoff creates problems. Need more information due to unknown toxicity risks. Much worse water quality than in Sacramento River system. All tribs receive agricultural runoff.
Water Temperature	H	Concern for upstream migrants in the fall and outmigrants in the late spring on lower tributaries (Stanislaus, Merced, and Tuolumne) and the mainstem San Joaquin River.
Undesirable Species Interactions	M	Primary concern is fry and juvenile predation by small and largemouth bass in tributaries, and unknown predators in the Delta.
Adverse Fish and Wildlife Harvest Impacts	M	High harvest rates for Central Valley fall run stocks affect escapement into the San Joaquin River.
Land use	M	General agricultural and urban impacts. Run-off of contaminants from irrigation of selenium-rich soils.
Artificial Propagation of Fish and associated population management	H	Relatively large production of hatchery fish, low population overall, potential genetic effects, straying, release practices cause problems.
Human Disturbance	L	No evidence of problems.
Wildfire	N/A	

PRIMARY SPECIES: WINTER RUN (tier one)

STRESSORS	RANK	COMMENTS
Alteration of Flows	H	Causes delays in migration and emigration (which can result in higher mortality due to predation), decreases habitat complexity, causes stranding of fish due to flow fluctuations, and leads to entrainment.
Floodplain and Marshplain Changes	H	Benefits to instream habitat. Increase in large woody debris may increase escapement numbers the following year by providing oversummering habitat.
Channel Form Changes	H	Decreases habitat complexity and limits gravel for spawning
Water Quality	M	Contaminants focus: consider Iron Mtn Mine possible effects on food web. Metals in upper Sacramento River are a risk to rearing. Pesticides and unknown toxicity in Delta are a risk to rearing and d/s migrants and have a possible food chain effect. Pesticides in the lower portion of the tributaries are a risk to rearing.
Water Temperature	L	Biologically important but currently is only a problem in extremely dry years with drawdown of Lake Shasta.
Undesirable Species Interactions	L	Predation by striped bass and squawfish on juveniles not considered a problem.
Adverse Fish and Wildlife Harvest Impacts	M	Poaching in inland rivers is main concern/ocean harvest has been problem but current regulations and biological opinion address problem.
Land use	L	Gravel for spawners annually introduced (CVPIA).
Artificial Propagation of Fish and Assoc Pop Mgmt	L	Hatchery releases less a problem on WR than on other runs.
Human Disturbance	L	Potential jet-boat disturbance of redds.
Wildfire	L	No evidence of a problem.

PRIMARY SPECIES: SPRING RUN (tier one)

STRESSORS	RANK	COMMENTS
Alteration of Flows	H	Primarily concerned with migration barriers on tribs, including Deer, Clear and Butte creeks. Also stranding and entrainment.
Floodplain and Marshplain Changes	H	Benefits most important for fry outmigrants.
Channel Form Changes	M/H	Lower tributary areas most important for fry and yearlings. If habitat improved rearing in lower tribs may occur. Riparian habitat also provides secondary benefits: shading, food, multi-species & ecosystem benefits
Water Quality	L	Less concern than winter run since Iron Mountain Mine not an issue for spring run. Tributary water quality better than mainstem. May be concerned with ag runoff & diazinon. Pesticides and unknown toxicity in Delta are a risk to d/s migrants. Pesticides and urban runoff in lower portions of tributaries are a slight risk to rearing.
Water Temperature	M	Concern for spring run due to timing of migration and spawning, especially in valley segments of the tributaries.
Undesirable Species Interactions	L	Predation by striped bass, squawfish, and other predators on juveniles is not considered a problem.
Adverse Fish and Wildlife Harvest Impacts	M	Poaching is a primary concern when adult fish are in summer holding habitat. May be more susceptible to ocean harvest.
Land use	M	Concerns due to grazing/gravel mining/ forestry practices & urbanization. Concern with forest roads causing sediment, lack of gravel, cattle grazing. Problems vary by stream--need to look at upper watershed practices.
Artificial Propagation of Fish and Assoc, Pop. Mgmt.	M/H	High production of hatchery fish on Feather River, potential impact on native gene pool.
Human Disturbance	M	Concern over recreational uses in summer holding habitat
Wildfire	L	Could be a problem if there are direct impacts on adult holding and spawning areas due to increased fine sediment input.

PRIMARY SPECIES: SACRAMENTO LATE FALL RUN (tier one)

STRESSORS	RANK	COMMENTS
Alteration of Flows	H	Causes delayed migration, associated high mortality due to predation, entrainment, decrease in biodiversity of habitat & stranding of fish.
Floodplain and Marshplain Changes	H	Causes straying & stranding of fish, decrease in habitat changes complexity, lack of large woody debris restoration.
Channel Form Changes	H	Causes decrease in habitat complexity, stranding and straying of fish.
Water Quality	M	Potential spilling of Spring Creek Debris Dam below Iron Mtn Mine. May be similar to risks for winter run.
Water Temperature	L	Water temperatures are suitable in upper Sac River.
Undesirable Species Interactions	L	Predation by stripped bass and squawfish on juveniles not considered a problem.
Adverse Fish and Wildlife Harvest Impacts	M	Ocean harvest fall run impacts on depressed stocks.
Land use	L	Gravel for spawners is annually introduced by CVPIA .
Artificial Propagation of Fish and Assoc Pop Mgmt	M	Large production of hatchery releases overlap with late fall run, unclear what impacts on the few remaining natural spawners. Less a problem than for steelhead.
Human Disturbance	L	Potential jet-boat disturbance of redds.
Wildfire	N/A	

PRIMARY SPECIES: STEELHEAD (tier one)

General comments: Research needed on life history and ecology of steelhead with particular interest in outmigration, genetic implications of hatcheries, Coleman impacts, mainstem production, timing of runs. Complex animal. Many of the actions need to be at the research and pilot level of implementation.

STRESSORS	RANK	COMMENTS
Alteration of Flows	H	Dams blocked access to historic spawning/rearing areas. There are some barriers on remaining stream reaches that are influenced by alteration of flows. Also stranding and entrainment.
Floodplain and Marshplain Changes	H	Reduction of flood frequency and magnitude, and bank protection projects, alters remaining habitat for rearing and outmigration. Floodplain and marshplain benefits most important for fry outmigrants.
Channel Form Changes	H	Lower elevation tributaries are important, and many of them are degraded.
Water Quality	L	Iron Mountain Mine (Spring Creek) discharge affects only the upper Sacramento River habitat, and has a low impact at the population level. Pesticides and unknown toxicity in Delta are a risk to d/s migrants. Pesticides and urban runoff in lower portions of tributaries are a slight risk to rearing.
Water Temperature	M	May be able to address with reservoir management to reduce temps for oversummer rearing fish. They are more tolerant of warm water temperatures than salmon.
Undesirable Species Interactions	L	Same predator concerns as salmon, but smolts are typically larger as outmigrants.
Adverse Fish and Wildlife Harvest Impacts	H	Inland tributary concern with sport harvest. Juvenile steelhead and rainbow trout are indistinguishable
Land use	M	Concern with forest roads causing sediment, lack of gravel cattle grazing. Problems vary by stream--need to look at upper watershed practices
Artificial Propagation of Fish and Assoc. Pop. Mgmt.	M/H	Almost all have now originated from hatcheries, few natural spawners, few wild fish, problems of release practices, hatchery runs compete with natural spawners. Hatchery stocks taken from out of basin.
Human Disturbance	L	Potential jet-boat disturbance of redds.
Wildfire	L	Could be a problem if there are direct impacts due to fine sediment input to tributaries.

PRIMARY SPECIES: DELTA SMELT (tier one)

STRESSORS	RANK	COMMENTS
Alteration of Flows	H	Relationship of population levels to X-2, and entrainment at export facilities and other in-Delta diversions.
Floodplain and Marshplain Changes	M	Species needs emergent vegetation but not clear if this is limiting factor. Need to protect existing habitat. Need more information on benefits of increased spawning habitat such as marshplain/emergent vegetation.
Channel orm Changes	M	Same as above.
Water Quality	H	Reason for high is because of concern over salinity--X2. Also of concern is contaminant level, due to urban and ag runoff, in Delta and how it may affect delta resident species. Need more information/research on effects on fish. Possible food chain effects.
Water Temperature	L	Not a concern for this species. No evidence of a problem.
Undesirable Species Interactions	M/H	Concern with inland silversides that may prey on larvae and clams which may affect food abundance for delta smelt. All other exotics are lower priority
Adverse Fish and Wildlife Harvest Impacts	N/A	
Land use	L	Linked to water quality problems.
Artificial Propagation of Fish and Assoc. Pop Mgmt	L	Current Biological Opinion and associated action addressing the problem
Human Disturbance	L	No evidence of a problem.
Wildfire	N/A	

PRIMARY SPECIES: GREEN STURGEON (tier one)

General comments: No ranking by stressor due to the lack of knowledge regarding what stressor is of most concern. Based on current level of knowledge primary areas of concern include flow, barriers, water quality-sediment, harvest, and entrainment. Additional research needed on the life history of the species.

Panel listed following information ("what we know"):

- Large flows seem to attract species to spawn. Spawning areas are further upstream compared to those used by white sturgeon on the Feather River and Sacramento River.
- Bottom feeders therefore sediment and water quality of concern.
- Population is down-may be due to harvest.
- DFG radio tagged one green sturgeon (all recaptures of green sturgeon that were tagged in the estuary occurred in the ocean, many off the coast of Oregon and Washington). Large catch in Clifton Ct forebay. Also in 50's before forebay constructed, large catch in vicinity of Santa Clara shoals. Juveniles also known to pass RBDD and GCID.

STRESSORS	RANK	COMMENTS
Alteration of Flows	*	
Floodplain and Marshplain Changes		
Channel Form Changes		
Water Quality	*	
Water Temperature		
Undesirable Species Interactions		
Adverse Fish and Wildlife Harvest Impacts	*	
Population Management		
Land use		
Artificial Propagation of Fish		
Human Disturbance		
Wildfire		

PRIMARY SPECIES: SPLITTAIL (2nd tier)

STRESSORS	RANK	COMMENTS
Alteration of Flows	H	Shallow areas important for spawning. Regulated flows affect frequency of shallow water availability.
Floodplain and Marshplain Changes	H	Floodplain/marshplain provides primary spawning habitat-habitat may be limiting in Delta. Major spawning areas are presently in the Yolo Bypass and San Joaquin River.
Channel Form Changes	H	Lack of SRA for rearing area.
Water Quality	M	Delta resident, spends more time in Delta, leading to higher exposure. Severe lack/gap of knowledge.
Water Temperature	L	Not an issue for this species.
Undesirable Species Interactions	L	None known.
Adverse Fish and Wildlife Harvest Impacts	L	Not an issue. Adults harvested in local fishery.
Land use	L	Urban area (Stockton), Delta agriculture leads to water quality and other impacts.
Artificial Propagation of Fish	N/A	
Human Disturbance	N/A	
Wildfire	N/A	

PRIMARY SPECIES: LONGFIN SMELT (2nd tier)

Comments/notes: Downstream of X2, 2-yr. life cycle, older the further downstream. Most years in San Pablo or W. Suisun, spawn in Big Break Delta or Western Delta. Emergent vegetation not limiting there. Larvae move quickly out of emergent veg. Diet--neomysis mainly.

STRESSORS	RANK	COMMENTS
Alteration of Flows	H	Reduction in outflows, entrainment issues. Abundance correlates positively with greater flow. Mechanism appears to relate to broader distribution of young in shallow, productive areas and therefore greater survival.
Floodplain and Marshplain Changes	ML	Habitat it lives in is not greatly altered or limiting. Lives in saline/brackish water, open shallow water habitat and emergent vegetation. Need to ensure existing habitat protected, food supply from marshplain may benefit fish.
Channel Form Changes	L	Channel form does not affect its habitat, which is open shallow water and emergent vegetation.
Water Quality	ML	Delta water high toxicity due to contaminants. Impact on fish resident to delta not known but of concern. Possible food chain effects.
Water Temperature	L	Not an issue.
Undesirable Species Interactions	MH	X-2 relationship has declined, linked to introduced clam. Clam seen as an indicator of potential impacts from other introduced. species. Possible food web relationship. Zooplankton changed also by clam. Need more info on management techniques.
Adverse Fish and Wildlife Harvest Impacts	N/A	
Land use	L	Linked to water qua ity.
Artificial Propagation of Fish and assoc. pop mgmt	N/A	
Human Disturbance	L	No evidence of a problem.
Wildfire	N/A	

SECONDARY SPECIES: MIGRATORY BIRDS

STRESSORS	SCORE	COMMENTS
Alteration of Flows	H	Tied to amount of wetted areas. Have altered natural hydrology which is needed for successful floodplain restoration.
Floodplain and Marshplain Changes	H	95% loss of wetlands, loss of riparian areas.
Channel Form Changes	H	Need river meander process, to create riparian habitat and backwaters habitat.
Water Quality	M/H	Se, mercury, pesticides, PCBs a concern in tissue. Problems from ag and urban runoff. Need to look at specific species. Generally a greater problem in S.J. River valley and Bay
Water Temperature	N/A	
Undesirable Species Interactions	L	Nest predation by red fox, cowbird (Nesting), specific to certain species and certain regions.
Adverse Fish and Wildlife Harvest Impacts	L	Migratory bird poaching/illegal hunting (??)
Land use	H	Riparian cleared for AG, urbanization. Habitat fragmentation. Impacts neotropicals because of ag clearing of riparian areas.
Artificial Propagation of Fish	N/A	
Human Disturbance	L	Re reational activity in delta. Maybe a concern for certain species-Swainson Hawks.
Wildfire	L	Loss of riparian concern in some areas.

SECONDARY SPECIES: STRIPED BASS

STRESSORS	RANK	COMMENTS
Alteration of Flows	H	Needs flow to spawn, entrainment issues, potential larval transport issues. Delta outflow enhances production.
Floodplain and Marshplain Changes	ML	Use wetlands and marshes in estuary as rearing areas.
Channel Form Changes	L	Adults are more open water users--similar to longfin smelt. Not dependent on channel form as habitat.
Water Quality	H	Definitive evidence of effects of toxics, copper loading. Shows impacts on tissue for Hg, PCBs, pesticides. This is a high concern, but no evidence for population effects. Pesticides in Delta and upstream are a risk to larvae and juveniles.
Water Temperature	L	No evidence of problem.
Undesirable Species Interactions	M	Food chain effects.
Adverse Fish and Wildlife Harvest Impacts	H	Poaching and sport fishing. Based on tag returns, sport fishing only takes about 10-20% annually. This is not believed to be excessive.
Land use	L	Related to water quality.
Artificial Propagation of Fish and Assoc. Pop. Mgmt.	N/A	Not of concern. Not a genetics issue, since the species is introduced.
Human Disturbance	L	No evidence of a problem.
Wildfire	N/A	

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